An LDAP Schema for Phone Books

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The distribution of this memo is unlimited. It is filed as <draft-ietf-roamops-ldap-phonebook-01.txt>, and expires September 15, 1998. Please send comments to the Roaming Operations Working Group mailing list (roamops@tdmx.rutgers.edu) or to the author (glennz@microsoft.com).

2. Abstract

This document describes an LDAP schema for the attributes to be included in the standard phone book. Goals of this document include:

- Creating a flexible, extensible and robust framework upon which to build a standard phone book
- Promoting a standard phone book format, to enhance interoperability between ISPs and roaming consortia

Non-goals of this document include:

- Attempting to create a ‘’Swiss army knife’, with phone book attributes to please everyone on Earth
- Definition of either server-server or client-server phone book update or transfer protocols
3. Rationale for LDAP Usage

The attributes are defined in terms that are directly usable by the Lightweight Directory Access Protocol (LDAP) for several reasons:

- Extensibility
- Flexibility
- Integration with LDAP-based Directory

Extensibility is important because phone books are living documents; as such, it is unlikely that all the semantic requirements of arbitrary Internet service providers (ISPs) would be met by a fixed scheme, no matter how well thought out. Phone book designers must be free to create new attributes in an well-understood fashion to meet changing business needs.

Flexibility is required of the attribute definition syntax for many of the same reasons that semantic extensibility is necessary. If we assume that phone book designers may need to define attributes of arbitrary type, the syntax chosen must be able to represent these objects cleanly. The meta-language used to describe LDAP attributes fits this bill nicely, since it can be used to unambiguously describe virtually any data type.

Integration with LDAP-based directories: although it is unlikely that phone books will be stored in the directory due to performance considerations, the creation of an LDAP schema describing phone book attributes leaves that option open, with relatively little incremental effort required to implement it.

4. Specification of Requirements

In this document, the key words "MAY", "MUST", "MUST NOT", "optional", "recommended", "SHOULD", and "SHOULD NOT", are to be interpreted as described in [1].

5. Object definitions

This document includes definitions of the following objects:

- Phone Book class
- Provider class
- POP class
- Support class
- Setup class
5.1. Phone Book Class

5.1.1. Description
The Phone Book class is the basic container for phone book entries. It always contains a phone book version number (applying to the phone book as a whole), a phone book name and one or more pointers (in the form of Distinguished Names) to POP objects. A Phone Book object may also contain multiple pointers to Provider and Setup objects (described below). These pointers also take the form of Distinguished Names.

5.1.2. Syntax
{
  phoneBookClass 1
    NAME 'phoneBookClass'
    SUP top
    STRUCTURAL
    MUST ( phoneBookVersion $ phoneBookName $ popPointer )
    MAY ( setupPointer $ providerPointer $ supportPointer )
}

5.2. Provider Class

5.2.1. Description
The Provider class contains attributes pertaining to the general business operations of a given network service provider. The attributes include such things as telephone number, mailing address, etc., as well as URLs for e-mail and a World Wide Web site. A Provider object may also contain a pointer (in the form of a Distinguished Name) to support information.

5.2.2. Syntax
{
  providerClass 1
    NAME 'providerClass'
    SUP top
    STRUCTURAL
    MAY ( 
      providerName $ providerIcon $ wwwURL $ generalMailtoURL $ billingMailtoURL $ businessCategory $ x121Address $ registeredAddress $ destinationIndicator $ preferredDeliveryMethod $ telexNumber $ teletexTerminalIdentifier $ telephoneNumber $ internationalISDNNumber $ facsimileTelephoneNumber $ street $ postOfficeBox $ postalCode $ postalAddress $ physicalDeliveryOfficeName 
    )
}
5.3. POP Class

5.3.1. Description
The POP class contains attributes relevant to individual network points of presence (POPs). The required attributes are addrFamily, address, media and entryVersion. The media attribute represents the media types supported by the POP, while the entryVersion attribute is a monotonically-increasing integer which should be incremented whenever the object is modified.

5.3.2. Syntax
{
    popClass 1
    NAME 'popClass'
    SUP top
    PARENT (
        country $ organization $ organizationalUnit
        $ locality $ container
    )
    STRUCTURAL
    MUST (
        addrFamily $ address $ media $ entryVersion
    )
    MAY (
        encodingType $ modemProtocols
        $ isdnProtocols $ city $ region $ country
        $ countryCode $ minBitsPerSecond
        $ maxBitsPerSecond $ areaCode
        $ unicastRoutingProtocols
        $ multicastRoutingProtocols $ dialScriptType
        $ dialScript $ pricing $ vpnProtocols $ popProperties
        $ popSetupPointer $ popSupportPointer $ popProviderPointer
    )
}  

5.4. Support Class

5.4.1. Description
The Support class includes those attributes that are pertinent to the provision of customer support for a POP or provider.

5.4.2. Syntax
{
    supportClass 1
    NAME 'supportClass'
    SUP top
}
5.5. Setup Class

5.5.1. Description
The Setup class includes attributes which describe services which may change from provider to provider or even from POP to POP. Many of the values contained in these attributes may be available by other means (e.g., DHCP), but others may not.

5.5.2. Syntax
{ setupClass 1
  NAME 'setupClass'
  SUP top
  PARENT (  
    country $ organization $ organizationalunit  
    $ locality $ container  
  )
  STRUCTURAL
  MAY (  
    supportTelephoneNumber $ supportLanguages  
    $ supportMailtoURL  
  )  
}

6. Attribute Definitions

6.1. New attributes defined for the Phone Book Class

6.1.1. Phone Book Version

6.1.1.1. Description
The phoneBookVersion attribute is an integer representing the version of the phone book; it is a monotonically increasing counter which should be incremented each time the phone book is modified. This attribute can be used by a server to help decide what (if any) actions are required to bring a client’s phone book up to date. For
example, the client can, at connect time, send an update request to the server including in the request the version number of its current phone book. If the client’s phone book version is not the same as the server’s current phone book version, the server can easily take appropriate action, e.g., reply with a URL pointing to a file containing the differences between the client and server phone books.

6.1.1.2. Syntax

(phoneBook phoneBookClass 1
 NAME ‘phoneBookVersion’
 DESC ‘Version number of the phone book’
 EQUALITY IntegerMatch
 SYNTAX ‘INTEGER’
 SINGLE-VALUE
 )

6.1.2. Phone Book Name

6.1.2.1. Description
The phoneBookName attribute is an arbitrary string assigned as an identifier for a phone book.

6.1.2.2. Syntax

(phoneBook phoneBookClass 2
 NAME ‘phoneBookName’
 DESC ‘The name of the phone book’
 EQUALITY caseIgnoreIA5Match
 SYNTAX PrintableString
 SINGLE-VALUE
 )

6.1.3. POP Pointer

6.1.3.1. Description
The popPointer attribute is a Distinguished Name which points to a POP object for this phone book.

6.1.3.2. Syntax

(phoneBook phoneBookClass 3
 NAME ‘popPointer’
 DESC ‘A pointer to one or more POP objects’
 EQUALITY distinguishedNameMatch
 SYNTAX ‘DN’
 )
6.1.4. Setup Pointer

6.1.4.1. Description
The setupPointer attribute is a Distinguished Name which points to a Setup object for this phone book.

6.1.4.2. Syntax
( phoneBook phoneBookClass 4
  NAME 'setupPointer'
  DESC 'A pointer to a Setup object for this phone book'
  EQUALITY distinguishedNameMatch
  SYNTAX 'DN'
  SINGLE-VALUE
)

6.1.5. Provider Pointer

6.1.5.1. Description
The providerPointer attribute is a Distinguished Name which points to a Provider object for this phone book.

6.1.5.2. Syntax
( phoneBook phoneBookClass 5
  NAME 'providerPointer'
  DESC 'A pointer to a Provider object for this phonebook'
  EQUALITY distinguishedNameMatch
  SYNTAX 'DN'
  SINGLE-VALUE
)

6.1.6. Support Pointer

6.1.6.1. Description
The supportPointer attribute is a Distinguished Name which points to a Support object for this phone book.

6.1.6.2. Syntax
( phoneBook phoneBookClass 6
  NAME 'supportPointer'
  DESC 'A pointer to a Support object for this phone book'
  EQUALITY distinguishedNameMatch
  SYNTAX 'DN'
  SINGLE-VALUE
)
6.2. New attributes defined for the Provider Class [3]

6.2.1. Provider Name

6.2.1.1. Description
   The providerName attribute is a string containing the name of the provider (e.g., "BIGNET Corporation").

6.2.1.2. Syntax
   ( phoneBook providerClass 1
       NAME 'providerName'
       DESC 'The name of the provider'
       EQUALITY caseIgnoreIA5Match
       SYNTAX 'PrintableString'
       SINGLE-VALUE
   )

6.2.2. Provider Icon

6.2.2.1. Description
   The providerIcon attribute contains a JPEG graphic which may be used for 'branding' phone book entries or displayed when dialing.

6.2.2.2. Syntax
   ( phoneBook providerClass 2
       NAME 'providerIcon'
       DESC 'An icon in JPEG format'
       EQUALITY octetStringMatch
       SYNTAX 'JPEG'
       SINGLE-VALUE
   )

6.2.3. Provider’s World Wide Web URL

6.2.3.1. Description
   The wwwURL attribute contains a Uniform Resource Locator (URL) for the provider’s Web site, for example, http://www.uu.net.

6.2.3.2. Syntax
   ( phoneBook providerClass 3
       NAME 'wwwURL'
       DESC 'A Uniform Resource Locator for the provider’s home page'
       EQUALITY caseExactIA5Match
       SYNTAX 'IA5String'
       SINGLE-VALUE
   )
6.2.4. Provider’s Main Email Address

6.2.4.1. Description
The generalMailtoURL attribute contains a URL for the provider’s main email address, for example, mailto://contact@uu.net. This URL could be used for general correspondence, complaints, etc.

6.2.4.2. Syntax
(phoneBook providerClass 4
  NAME ‘generalMailtoURL’
  DESC ‘A Uniform Resource Locator for the provider’s email address’
  EQUALITY caseExactIA5Match
  SYNTAX ‘IA5String’
  SINGLE-VALUE)

6.2.5. Billing Inquiry Email Address

6.2.5.1. Description
The billingMailtoURL attribute contains a URL for the provider’s billing support email address, for example, mailto://billing@uu.net. This URL could be used for correspondence regarding billing and payment issues.

6.2.5.2. Syntax
(phoneBook providerClass 6
  NAME ‘billingMailtoURL’
  DESC ‘A Uniform Resource Locator for the email address to be used for billing inquiries’
  EQUALITY caseExactIA5Match
  SYNTAX ‘IA5String’
  SINGLE-VALUE)

6.3. New attributes defined for the POP Class

6.3.1. Address Family

6.3.1.1. Description
The addrFamily attribute is an integer which represents the address family to which the value in the address attribute (below) belongs. For POPs offering dial-up network access, the addrFamily attribute will generally contain a value for a telephone network based address family. The current list of IANA-assigned address family numbers is reproduced below for convenience; for an up-to-date list, see [2].

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reserved
1 IP (IP version 4)
2 IP6 (IP version 6)
3 NSAP
4 HDLC (8-bit multidrop)
5 BBN 1822
6 802 (includes all 802 media
   plus Ethernet "canonical format")
7 E.163
8 E.164 (SMDS, Frame Relay, ATM)
9 F.69 (Telex)
10 X.121 (X.25, Frame Relay)
11 IPX
12 Appletalk
13 Decnet IV
14 Banyan Vines
65535 Reserved

6.3.1.2. Syntax
{ phoneBook popClass 1
   NAME 'addrFamily'
   SUP top
   DESC 'The address family to which the address attribute
       below belongs'
   EQUALITY integerMatch
   SYNTAX INTEGER
   SINGLE-VALUE
 }

6.3.2. Address

6.3.2.1. Description
The address attribute in a binary quantity representing the address
of the POP. For POPs offering dial-up network access, the address
attribute will generally contain an IA5 string representing a telephone number, formatted in standard fashion [4] (e.g. "+ 1 234 5678").

6.3.2.2. Syntax
{ phoneBook popClass 2
   NAME 'address'
   SUP top
   DESC 'A network address for this POP'
   EQUALITY bitStringMatch
   SYNTAX 'BitString'
   SINGLE-VALUE
 }
6.3.3. Media

6.3.3.1. Description
The media attribute describes the types of media supported by this POP. The following values are defined:

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modem</td>
<td>1</td>
</tr>
<tr>
<td>ISDN</td>
<td>2</td>
</tr>
<tr>
<td>ATM</td>
<td>3</td>
</tr>
<tr>
<td>Frame Relay</td>
<td>4</td>
</tr>
<tr>
<td>X.25</td>
<td>5</td>
</tr>
<tr>
<td>SMDS</td>
<td>6</td>
</tr>
</tbody>
</table>

6.3.3.2. Syntax
```
(phoneBook popClass 3
  NAME 'media'
  SUP top
  DESC 'The types of media supported by this POP'
  EQUALITY integerMatch
  SYNTAX INTEGER)
```

6.3.4. Entry Version

6.3.4.1. Description
The entryVersion attribute is an integer representing the version of the POP object; it is a monotonically increasing counter which should be incremented each time the object is modified. This attribute may be useful in merging and updating phone books.

6.3.4.2. Syntax
```
(phoneBook popClass 4
  NAME 'entryVersion'
  DESC 'version number of POP object'
  EQUALITY IntegerMatch
  SYNTAX 'INTEGER'
  SINGLE-VALUE
)
```

6.3.5. Encoding Type

6.3.5.1. Description
The encodingType attribute is an integer representing the type of encoding used within a specific address family. The value ‘0’ is reserved and represents the native encoding.
6.3.5.2. Syntax

```c
(phoneBook popClass 5
    NAME 'entryVersion'
    DESC 'the type of encoding used within this address family'
    EQUALITY IntegerMatch
    SYNTAX 'INTEGER'
    SINGLE-VALUE
)
```

6.3.6. Modem Protocols

6.3.6.1. Description

The `modemProtocols` attribute is a bit string representing the modem protocols supported by the access devices that can be reached at address. The initially defined modem protocol flags are listed in the table below. All `Position` values are in hexadecimal, all `Speed` values are in bits per second. If the bit in `Position` is 1, `Protocol` is supported; otherwise, `Protocol` is unsupported. For example, the string 00110001 (0x31) means that V.21, V.32bis and V.34 are supported while V.22, V.29 and V.32 are not.

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Duplex</th>
<th>Speed</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>V21</td>
<td>0x0001</td>
<td>Full</td>
<td>300</td>
<td>ITU-T V.21</td>
</tr>
<tr>
<td>V22</td>
<td>0x0002</td>
<td>Full</td>
<td>1200</td>
<td>ITU-T V.22</td>
</tr>
<tr>
<td>V29</td>
<td>0x0004</td>
<td>Half</td>
<td>9600</td>
<td>ITU-T V.29</td>
</tr>
<tr>
<td>V32</td>
<td>0x0008</td>
<td>Full</td>
<td>9600</td>
<td>ITU-T V.32</td>
</tr>
<tr>
<td>V32b</td>
<td>0x0010</td>
<td>Full</td>
<td>14.4k</td>
<td>ITU-T V.32bis</td>
</tr>
<tr>
<td>V34</td>
<td>0x0020</td>
<td>Full</td>
<td>28.8k</td>
<td>ITU-T V.34</td>
</tr>
<tr>
<td>VF</td>
<td>0x0040</td>
<td>Full</td>
<td>V.FAST</td>
<td></td>
</tr>
</tbody>
</table>

Question: Are these flags useful? If so, are there more that need to be added?

6.3.6.2. Syntax

```c
(phoneBook popClass 6
    NAME 'modemProtocols'
    DESC 'A bit string representing the modem protocols supported by the access devices at this POP'
    EQUALITY bitStringMatch
    SYNTAX 'BitString'
    SINGLE-VALUE
)
```
6.3.7. ISDN Protocols

6.3.7.1. Description
The `isdnProtocols` attribute is a bit string representing the ISDN protocols supported by the access devices that can be reached at address. The initially defined ISDN protocols are listed in the table below. All 'Value' values are in hexadecimal, all 'Speed' values are in bits per second. If the bit in 'Position' is 1, 'Protocol' is supported; otherwise, 'Protocol' is unsupported. For example, the string 00001101 (0x0d) means that V.120 is supported at both 56K and 64K bps while V.110 is supported only at 19.2K bps.

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Speed</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>V110L</td>
<td>0x0001</td>
<td>19.2k</td>
<td>ITU-T V.110</td>
</tr>
<tr>
<td>V110H</td>
<td>0x0002</td>
<td>38.4k</td>
<td>ITU-T V.110</td>
</tr>
<tr>
<td>V120L</td>
<td>0x0004</td>
<td>56k</td>
<td>ITU-T V.120</td>
</tr>
<tr>
<td>V120H</td>
<td>0x0008</td>
<td>64k</td>
<td>ITU-T V.120</td>
</tr>
</tbody>
</table>

Question: Are the ISDN flags useful? If so, should there be more?

6.3.7.2. Syntax
```c
{ phoneBook popClass 7
  NAME 'isdnProtocols'
  DESC 'A bit string representing the ISDN flavors supported by the access devices at this POP'
  EQUALITY bitStringMatch
  SYNTAX 'BitString'
  SINGLE-VALUE
}
```

6.3.8. City

6.3.8.1. Description
The `city` attribute contains the name of the city in which the POP is located (not the city(s) from which it is accessible by a local call).

6.3.8.2. Syntax
```c
{ phoneBook popClass 8
  NAME 'city'
  DESC 'The name of the city in which this POP is located'
  EQUALITY caseExactIA5Match
  SYNTAX 'IA5String {64}'
  SINGLE-VALUE
}
```
6.3.9. Region

6.3.9.1. Description
The region attribute contains the name of the region in which the POP is located. In the United States, this would be the name of a state or (for Washington, D.C.) administrative district. In other countries, it might be the name of a province, parish or county.

6.3.9.2. Syntax

```
(phoneBook popClass 9
  NAME 'region'
  DESC 'The name of the region in which this POP is located'
  EQUALITY caseExactIA5Match
  SYNTAX 'IA5String {64}'
  SINGLE-VALUE)
```

6.3.10. Country

6.3.10.1. Description
The country attribute contains the name of the country in which the POP is located. The country name may be abbreviated (e.g., "USA" for the United States of America or "UK" for the United Kingdom) but if abbreviations are used the usage must be consistent within a given phone book.

6.3.10.2. Syntax

```
(phoneBook popClass 10
  NAME 'country'
  DESC 'The name of the country in which this POP is located'
  EQUALITY caseExactIA5Match
  SYNTAX 'IA5String {64}'
  SINGLE-VALUE)
```

6.3.11. Country Code

6.3.11.1. Description
The countryCode attribute indicates the international dialing prefix for the country in which the POP is located.

6.3.11.2. Syntax

```
(phoneBook popClass 11
  NAME 'countryCode'
  DESC 'ITU dialing code for the country in which this POP is located'
  EQUALITY integerMatch
  SYNTAX 'INTEGER')
```
6.3.12. Minimum Data Rate

6.3.12.1. Description
The minBitsPerSecond attribute indicates the minimum data rate (in bits/second) supported by the access devices at the POP.

6.3.12.2. Syntax

```
(phoneBook popClass 12
  NAME 'minBitsPerSecond'
  DESC 'Minimum data rate supported by this POP'
  in bits/second'
  EQUALITY integerMatch
  SYNTAX 'INTEGER'
  SINGLE-VALUE
)
```

6.3.13. Maximum Data Rate

6.3.13.1. Description
The maxBitsPerSecond attribute indicates the maximum data rate (in bits/second) supported by the access devices at the POP.

6.3.13.2. Syntax

```
(phoneBook popClass 13
  NAME 'maxBitsPerSecond'
  DESC 'Maximum data rate supported by this POP'
  in bits/second'
  EQUALITY integerMatch
  SYNTAX 'INTEGER'
  SINGLE-VALUE
)
```


6.3.14.1. Description
The areaCode attribute contains the area or city code component of the telephone number in the ‘address’ attribute (if any) associated with this POP.

6.3.14.2. Syntax

```
(phoneBook popClass 14
  NAME 'areaCode'
  DESC 'Area or city code component of the telephone number in the accessTelephoneNumber attribute associated with this POP'
)
```

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EQUALITY integerMatch
SYNTAX INTEGER
SINGLE-VALUE

6.3.15. Unicast Routing Protocols

6.3.15.1. Description
The unicastRoutingProtocols attribute is a bitstring representing the unicast routing protocols supported by this POP. The initially defined values are listed in the table below. If the bit in ‘Position’ is 1, ‘Protocol’ is supported; otherwise, ‘Protocol’ is unsupported.

<table>
<thead>
<tr>
<th>Position</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0001</td>
<td>Static</td>
</tr>
<tr>
<td>0x0002</td>
<td>RIP v1</td>
</tr>
<tr>
<td>0x0004</td>
<td>RIP v2</td>
</tr>
<tr>
<td>0x0008</td>
<td>OSPF</td>
</tr>
<tr>
<td>0x0010</td>
<td>IS-IS</td>
</tr>
<tr>
<td>0x0020</td>
<td>IGRP</td>
</tr>
<tr>
<td>0x0040</td>
<td>EIGRP</td>
</tr>
<tr>
<td>0x0080</td>
<td>BGP</td>
</tr>
</tbody>
</table>

6.3.15.2. Syntax

(phoneBook popClass 15
  NAME 'unicastRoutingProtocols'
  DESC 'A bit string representing the unicast routing protocols supported by the access devices at this POP'
  EQUALITY bitStringMatch
  SYNTAX 'BitString'
  SINGLE-VALUE
)

6.3.16. Multicast Routing Protocols

6.3.16.1. Description
The multicastRoutingProtocols attribute is a bitstring representing the multicast routing protocols supported by this POP. The initially defined values are listed in the table below. If the bit in ‘Position’ is 1, ‘Protocol’ is supported; otherwise, ‘Protocol’ is unsupported.

<table>
<thead>
<tr>
<th>Position</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0001</td>
<td>Static</td>
</tr>
<tr>
<td>0x0002</td>
<td>DVMRP</td>
</tr>
</tbody>
</table>
0x0004  SM-PIM
0x0008  DM-PIM
0x0010  CBT v1
0x0020  CBT v2
0x0040  BGMP
0x0080  Proxy IGMP

6.3.16.2. Syntax
   ( phoneBook popClass 15
      NAME 'multicastRoutingProtocols'
      DESC 'A bit string representing the multicast routing
             protocols supported by the access devices at this POP'
      EQUALITY bitStringMatch
      SYNTAX 'BitString'
      SINGLE-VALUE)

6.3.17. Dial Script Type

6.3.17.1. Description
   The dialScript attribute indicates the type of dialing script that
   should be used when connecting to this POP.

   Question: What kinds of scripts are there?

6.3.17.2. Syntax
   ( phoneBook popClass 16
      NAME 'dialScriptType'
      DESC 'Type of the dial script to be used'
      EQUALITY caseExactIA5Match
      SYNTAX 'IA5String {64}'
      SINGLE-VALUE)

6.3.18. Dialing Script

6.3.18.1. Description
   The dialScript attribute contains the dialing script to be used when
   connecting to this POP.

6.3.18.2. Syntax
   ( phoneBook popClass 17
      NAME 'dialScript'
      DESC 'The dial script to be used'
      EQUALITY caseIgnoreIA5Match
      SYNTAX 'IA5String'
      SINGLE-VALUE)
6.3.19. Pricing Information

6.3.19.1. Description
The pricing attribute is a free-form string representing pricing information for this POP. It may be anything from a simple string indicating relative expense (e.g., "$$$$" for a very expensive POP) to a paragraph describing time-of-day and other differential pricing variables.

6.3.19.2. Syntax

```
(phoneBook popClass 18
  NAME 'pricing'
  DESC 'Pricing information for this POP'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 'IA5String'
)
```

6.3.20. Tunneling Protocols

6.3.20.1. Description
The tunnelingProtocols attribute is a bitstring representing the tunneling protocols supported by this POP. The initially defined values are listed in the table below. If the bit in ‘Position’ is 1, ‘Protocol’ is supported; otherwise, ‘Protocol’ is unsupported.

<table>
<thead>
<tr>
<th>Position</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0001</td>
<td>PPTP</td>
</tr>
<tr>
<td>0x0002</td>
<td>L2F</td>
</tr>
<tr>
<td>0x0004</td>
<td>L2TP</td>
</tr>
<tr>
<td>0x0008</td>
<td>ATMP</td>
</tr>
<tr>
<td>0x0010</td>
<td>VTP</td>
</tr>
<tr>
<td>0x0020</td>
<td>IP AH Tunnel Mode</td>
</tr>
<tr>
<td>0x0040</td>
<td>IP-IP</td>
</tr>
<tr>
<td>0x0080</td>
<td>Minimal IP-IP</td>
</tr>
<tr>
<td>0x0100</td>
<td>IP ESP Tunnel Mode</td>
</tr>
<tr>
<td>0x0200</td>
<td>GRE</td>
</tr>
<tr>
<td>0x0400</td>
<td>Bay DVS</td>
</tr>
</tbody>
</table>

6.3.20.2. Syntax

```
(phoneBook popClass 21
  NAME 'tunnelingProtocols'
  DESC 'A bit string representing the tunneling protocols supported by the access devices at this POP'
  EQUALITY bitStringMatch
  SYNTAX 'BitString'
  SINGLE-VALUE
)
```
6.3.21. POP Properties

6.3.21.1. Description
The popProperties attribute is a bitstring representing a variety of Boolean properties characterizing this POP. The initially defined properties are listed in the table below. If the bit in 'Position' is 1, 'Property' is supported; otherwise, 'Property' is unsupported.

<table>
<thead>
<tr>
<th>Position</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0001</td>
<td>Multilink</td>
</tr>
<tr>
<td>0x0002</td>
<td>Mobile IP</td>
</tr>
<tr>
<td>0x0004</td>
<td>Multicast Reception</td>
</tr>
<tr>
<td>0x0008</td>
<td>Multicast Transmission</td>
</tr>
</tbody>
</table>

6.3.21.2. Syntax
( phoneBook popClass 22
  NAME 'popProperties'
  DESC 'A bit string representing a variety of Boolean properties characterizing this POP'
  EQUALITY bitStringMatch
  SYNTAX 'BitString'
  SINGLE-VALUE
)

6.3.22. POP Setup Pointer

6.3.22.1. Description
The popSetupPointer attribute is a Distinguished Name which points to a Setup object for this POP.

6.3.22.2. Syntax
( phoneBook popClass 23
  NAME 'popSetupPointer'
  DESC 'A pointer to a Setup object for this POP'
  EQUALITY distinguishedNameMatch
  SYNTAX 'DN'
  SINGLE-VALUE
)

6.3.23. POP Support Pointer

6.3.23.1. Description
The popSupportPointer attribute is a Distinguished Name which points to a Support object for this POP.
6.3.23.2.  Syntax

( phoneBook popClass 25
    NAME 'popSupportPointer'
    DESC 'A pointer to a Support object for this POP'
    EQUALITY distinguishedNameMatch
    SYNTAX 'DN'
    SINGLE-VALUE
)

6.3.24.  POP Provider Pointer

6.3.24.1.  Description
The popProviderPointer attribute is a Distinguished Name which points to a Provider object for this POP.

6.3.24.2.  Syntax

( phoneBook popClass 24
    NAME 'popProviderPointer'
    DESC 'A pointer to a Provider object for this POP'
    EQUALITY distinguishedNameMatch
    SYNTAX 'DN'
    SINGLE-VALUE
)

6.4.  New attributes defined for the Support Class

6.4.1.  Support Telephone Number

6.4.1.1.  Description
The supportTelephoneNumber attribute contains a number that may be called to reach the support center for a particular provider or POP. This attribute is basically a string and should contain the entire telephone number in international form, e.g., "+1 425 838 8080".

6.4.1.2.  Syntax

( phoneBook supportClass 1
    NAME 'supportTelephoneNumber'
    SUP TelephoneNumber
    DESC 'The number to be dialed to contact customer support for this POP or provider'
    SINGLE-VALUE
)

6.4.2.  Support Languages
6.4.2.1. Description
The `supportLanguages` attribute contains a comma-separated list of languages spoken by the staff at the support center at `supportTelephoneNumber`.

Question: Is there a standard way to represent languages (like country codes for phone numbers)?

6.4.2.2. Syntax
```plaintext
( phoneBook supportClass 2
    NAME 'supportLanguages'
    DESC 'A comma-separated list of languages spoken by support personnel for this POP or provider'
    EQUALITY caseExactIA5Match
    SYNTAX 'IA5String'
    SINGLE-VALUE
)
```

6.4.3. Support Email Address

6.4.3.1. Description
The `supportMailtoURL` attribute contains a URL for the provider’s customer support email address, for example, `mailto://support@uu.net`. This URL could be used to contact customer support personnel regarding non-urgent issues.

6.4.3.2. Syntax
```plaintext
( phoneBook supportClass 3
    NAME 'supportMailtoURL'
    DESC 'A Uniform Resource Locator for the provider’s customer support email address'
    EQUALITY caseExactIA5Match
    SYNTAX 'IA5String'
    SINGLE-VALUE
)
```

6.5. New attributes defined for the Setup class

6.5.1. DNS Server Address

6.5.1.1. Description
The `dnsServerAddress` attribute represents the IP address of the Domain Name Service (DNS) server which should be used when connected to this POP. The address is represented in the form of a string in dotted-decimal notation (e.g., 192.168.101.1).
6.5.1.2. Syntax

{ phoneBook setupClass 1
  NAME 'dnsServerAddress'
  DESC 'Domain Name Server IP address (in dotted decimal notation)'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 'IA5String (128)'
  SINGLE-VALUE
}

6.5.2. NNTP Server Name

6.5.2.1. Description
The nntpServerName attribute contains the fully qualified domain name (FQDN) of the Network News Transfer Protocol (NNTP) server which should be used when connected to this POP.

6.5.2.2. Syntax
{ phoneBook setupClass 2
  NAME 'nntpServerName'
  DESC 'Name of an NNTP server'
  EQUALITY caseIgnoreIA5Match
  SUBSTRINGS caseIgnoreIA5SubstringsMatch
  SYNTAX 'IA5String'
  SINGLE-VALUE
}

6.5.3. SMTP Server Name

6.5.3.1. Description
The smtpServerName attribute contains the FQDN of the Simple Mail Transfer Protocol (SMTP) server which should be used when connected to this POP.

6.5.3.2. Syntax
{ phoneBook setupClass 3
  NAME 'smtpServerName'
  DESC 'Name of an SMTP mail server'
  EQUALITY caseIgnoreIA5Match
  SUBSTRINGS caseIgnoreIA5SubstringsMatch
  SYNTAX 'IA5String'
  SINGLE-VALUE
}

6.5.4. POP3 Server Name
6.5.4.1. Description
The popServerName attribute contains the FQDN of the Post Office Protocol (POP) server which should be used when connected to this POP.

6.5.4.2. Syntax
{ phoneBook setupClass 4
  NAME 'popServerName'
  DESC 'Name of an POP3 mail server'
  EQUALITY caseIgnoreIA5Match
  SUBSTRINGS caseIgnoreIA5SubstringsMatch
  SYNTAX 'IA5String'
  SINGLE-VALUE
}

6.5.5. IMAP Server Name

6.5.5.1. Description
The imapServerName attribute contains the FQDN of the Internet Mail Access Protocol (IMAP) server which should be used when connected to this POP.

6.5.5.2. Syntax
{ phoneBook setupClass 5
  NAME 'imapServerName'
  DESC 'Name of an IMAP4 server'
  EQUALITY caseIgnoreIA5Match
  SUBSTRINGS caseIgnoreIA5SubstringsMatch
  SYNTAX 'IA5String'
  SINGLE-VALUE
}

6.5.6. WWW Proxy

6.5.6.1. Description
The wwwProxyServerName attribute contains the FQDN of the World Wide Web (WWW) proxy server which should be used when connected to this POP.

6.5.6.2. Syntax
{ phoneBook setupClass 6
  NAME 'wwwProxyServerName'
  DESC 'Name of an WWW Proxy'
  EQUALITY caseIgnoreIA5Match
  SUBSTRINGS caseIgnoreIA5SubstringsMatch
  SYNTAX 'IA5String'
  SINGLE-VALUE
}
6.5.7. FTP Proxy

6.5.7.1. Description
The ftpProxyServerName attribute contains the FQDN of the File Transfer Protocol (FTP) proxy server which should be used when connected to this POP.

6.5.7.2. Syntax
{(phoneBook setupClass 7
    NAME 'ftpProxyServerName'
    DESC 'Name of an FTP Proxy'
    EQUALITY caseIgnoreIA5Match
    SUBSTRINGS caseIgnoreIA5SubstringsMatch
    SYNTAX 'IA5String'
    SINGLE-VALUE)
}

6.5.8. Winsock Proxy

6.5.8.1. Description
The winsockProxyServerName attribute contains the FQDN of the Windows Socket (Winsock) proxy server which should be used when connected to this POP.

6.5.8.2. Syntax
{(phoneBook setupClass 8
    NAME 'winsockProxyServerName'
    DESC 'Name of an Winsock Proxy'
    EQUALITY caseIgnoreIA5Match
    SUBSTRINGS caseIgnoreIA5SubstringsMatch
    SYNTAX 'IA5String'
    SINGLE-VALUE)
}

6.5.9. Default Gateway Address

6.5.9.1. Description
The defaultGatewayAddress attribute represents the address of the default gateway which should be used when connected to this POP. The address is represented in the form of a string in dotted-decimal notation (e.g., 192.168.101.1).

6.5.9.2. Syntax
{(phoneBook setupClass 8
    NAME 'defaultGatewayAddress'
    DESC 'Default Gateway IP address (in dotted decimal notation)'
    EQUALITY caseIgnoreIA5Match
    SYNTAX 'IA5String {128}')
6.5.10. User Name Suffix

6.5.10.1. Description
The userNameSuffix attribute represents a string which should be con- catenated to the base username. For example, if the base username is "userA" and the value of this attribute is "@bigco.com", the resulting augmented username would be "userA@bigco.com". An intelligent dialer may concatenate the string automatically. Note that both the userNameSuffix and the userNamePrefix (below) may be applied to the same base username.

6.5.10.2. Syntax
{ phoneBook setupClass 9
  NAME 'userNameSuffix'
  DESC 'User Name suffix'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 'IA5String {128}'
  SINGLE-VALUE
}

6.5.11. User Name Prefix

6.5.11.1. Description
The userNamePrefix attribute represents a string to which the base username should be concatenated. For example, if the base username is "userB" and the value of this attribute is "BIGCO/" the resulting augmented username would be "BIGCO/userB". An intelligent dialer may perform the concatenation automatically. Note that both the userNameSuffix (above) and the userNamePrefix may be applied to the same base username.

6.5.11.2. Syntax
{ phoneBook setupClass 10
  NAME 'userNamePrefix'
  DESC 'User Name prefix'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 'IA5String {128}'
  SINGLE-VALUE
}

7. Security Considerations

None (submissions welcome).

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8. References


[3] The rest of the attributes in this class are described in RFC 1274


9. Acknowledgements

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